DOS POBRES/SAN JUAN PROJECT
404(b)(1) ALTERNATIVES ANALYSIS

Submitted to:

U.S. ARMY CORPS OF ENGINEERS
Los Angeles District, Regulatory Branch
Arizona Section

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EXECUTIVE SUMMARY

An alternatives analysis is required by the U.S. Army Corps of Engineers (COE) and the U.S. Environmental Protection Agency (EPA) to demonstrate compliance with guidelines established under the Clean Water Act (CWA), Section 404(b)(1) (40 CFR §230) for avoidance and minimization of impacts to jurisdictional waters of the United States. This analysis is designed to identify practicable alternatives for the Dos Pobres/San Juan Project proposed by Phelps Dodge Safford, Inc. (PDSI)

The formulation of alternatives to the proposed Mining Plan of Operations (the Proposed Action) has been based upon information provided by the COE, BLM, and PDSI. Each alternative's practicability, in light of specific technical, logistic, and economic criteria, is evaluated. Many of the alternatives considered were developed to minimize impacts to waters of the United States which in the project area are primarily ephemeral washes. Xeroriparian habitats associated with these washes are of relatively low value[1] when compared to other xeroriparian and riparian habitats in southern Arizona. None of the alternatives considered would completely avoid impacts to waters of the U.S. and all practicable alternatives would affect waters of the United States to varying degrees.

A total of nine configuration alternatives (Alternatives A-I), two Safford District location alternatives (J and K), two compactible soil borrow source alternatives, and two SX/EW location alternatives (listed below) were considered.

Of the nine configuration alternatives and two Safford District location alternatives considered, only Alternative C, *Partial Backfill of San Juan Pit*, and Alternative I, *Single, Reduced Leach Pad/Crush Convey w/ Haul Truck Placement*, are practicable, considering technical, logistic, and economic measures of practicability. The alternatives considered represents a reasonable range of alternatives that exist to achieve the project's purpose and need and are technically capable of being accomplished. All alternatives eliminated were considered impracticable for logistic and/or economic reasons. Considering the constraints imposed by the ore bodies, the distribution of other ore reserves in the project area, and the nature and distribution of waters of the U.S. in the project area, the development of another practicable alternative similar or not to the alternatives considered in this analysis, that significantly minimizes or avoids impacts to waters of the United States, is unlikely.

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[1] Total vegetation volume (TVV) within the ephemeral arroyos in the project area typically ranges from a value of 0.25 to 0.65 m^3/m^2 and averages approximately 0.45 m^3/m^2. Upland habitats on this property have vegetation volume of from 0.1 to 0.33 m^3/m^2. and averaged approximately 0.25 m^3/m^2. For comparison, well-vegetated upland Sonoran Desert Scrub habitat in Northwest Tucson will typically have TVV slightly greater than 0.5 m^3/m^2; Mesquite Bosques typically exceed 1.5 m^3/m^2 and mature Cottonwood/Willow riparian habitats typically exceed 3.0 m^3/m^2.

- Alternative A — Two Leach Stockpiles
- Alternative B — Single Leach Stockpile w/Conveyor Stacker
- Alternative C — Partial Backfill of San Juan Pit
- Alternative D — Reduced San Juan Pit
- Alternative E — Dos Pobres Mine Only
- Alternative F — San Juan Mine Only
- Alternative G — No Set Back at Dos Pobres
- Alternative H — A Single 700 ft. High Leach Stockpile
- Alternative I — Single Leach Stockpile/Crush Convey w/ Haul Truck Placement
- Alternative J — Develop Sanchez Mine First
- Alternative K — Develop Lone Star Mine First
- Lone Star Compactible Soil Borrow Source
- Watson Wash/Reduced Lone Star Compactible Soil Borrow Source
- East SX/EW Plant Location
- West SX/EW Plant Location

Only the Lone Star compactible soil borrow source alternative is considered logistically and economically practicable. Both of the SX/EW location alternatives are practicable. Each of these alternatives would be sited to minimize impacts to waters of the United States. The East SX/EW facility would require construction of a pipeline corridor to transport pregnant leach solution (PLS) and raffinate solution between the SX/EW plant and the leach stockpile. This alternative would result in pipeline crossings of approximately six drainages identified as waters of the United States, including Talley, Cottonwood, Peterson, and Wilson Washes.

1. INTRODUCTION

1.1. DOCUMENT PURPOSE AND ORGANIZATION

Phelps Dodge Safford, Inc. (PDSI) has submitted a Mining Plan of Operations (MPO) for the Dos Pobres/San Juan Project north of Safford, Arizona (Figure 1A). An alternatives analysis is required by the U.S. Army Corps of Engineers (COE) and the U.S. Environmental Protection Agency (EPA) to demonstrate compliance with guidelines established under the Clean Water Act (CWA), Section 404(b)(1) (40 CFR §230) for avoidance and minimization of impacts to jurisdictional waters of the United States. This analysis is designed to identify practicable alternatives for the Dos Pobres/San Juan Project proposed by PDSI based upon technical, logistic, and economic criteria. This analysis will be integrated into the *Dos Pobres/San Juan Project Mining Plan of Operations EIS.*

The alternatives analysis is presented in four sections:

1) This *Introduction* (Section 1) which includes the project background and history, the project's purpose and need statement, and a description of the proposed project area;

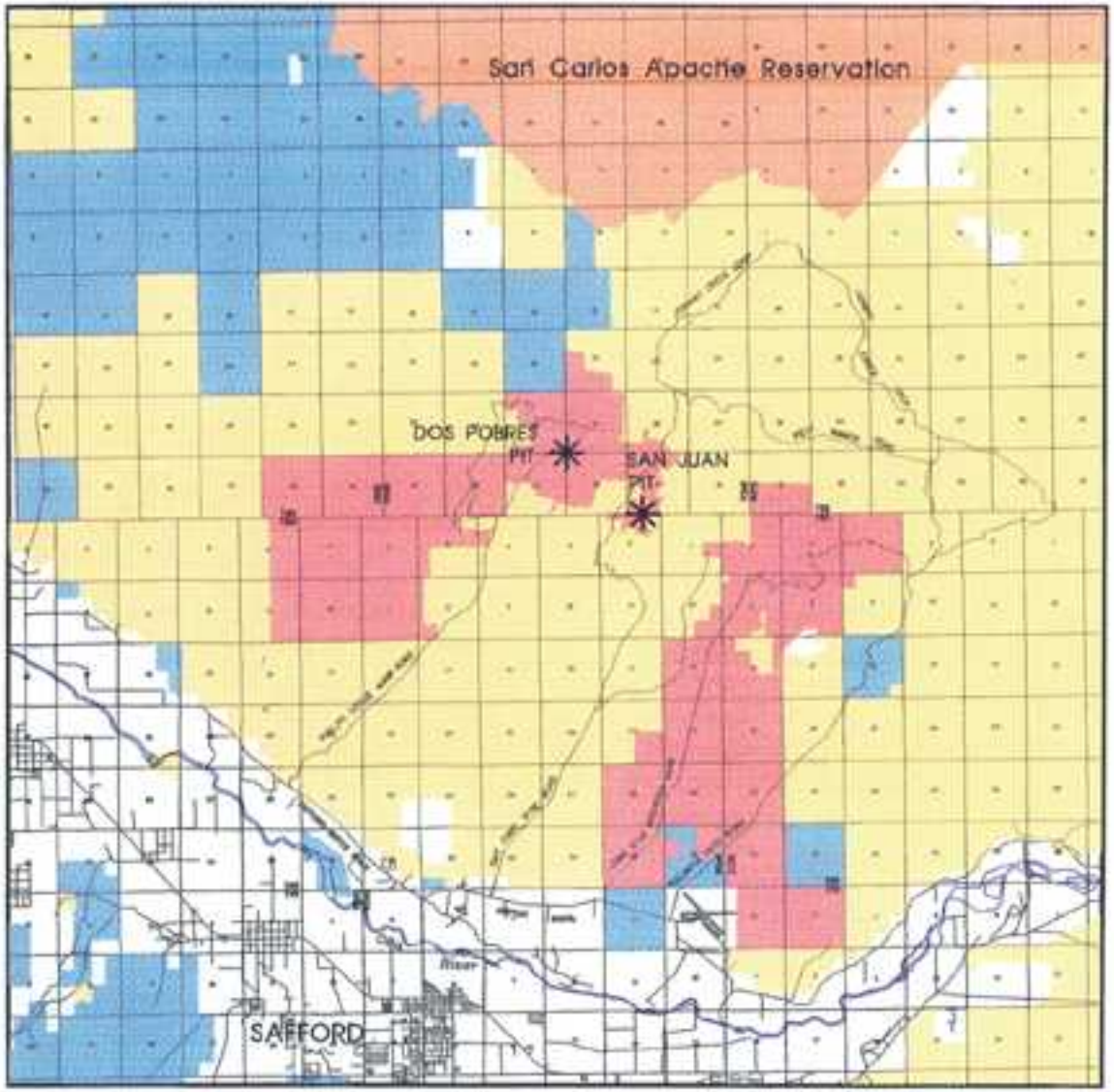
2) Section 2, *Formulation and Analysis of Alternatives*, which includes: a) a description of the general approach taken in formulating alternatives, including description of the geographic scope of the alternatives; b) a description of the practicability criteria; and c) description and practicability analysis of each of the alternatives identified; and

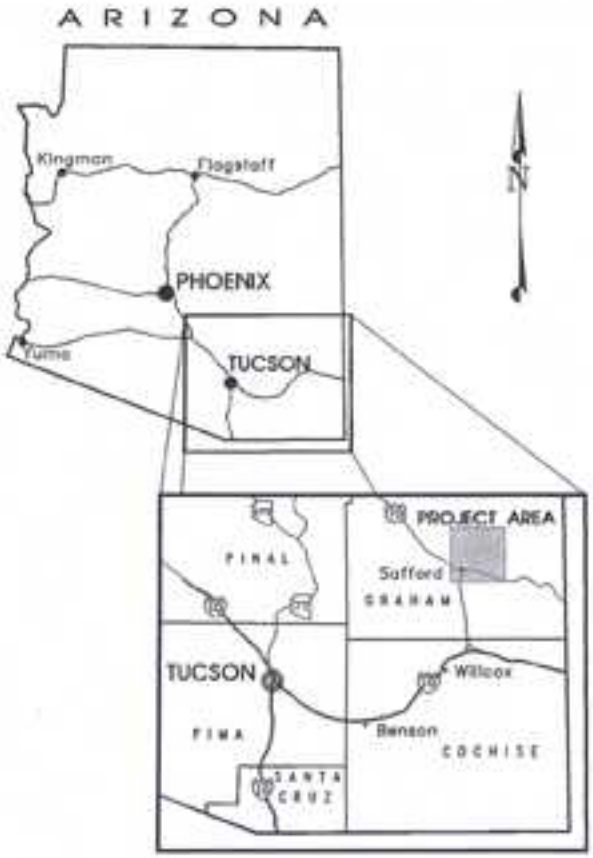
3) Section 3, a summary of the results of the practicability evaluation.

1.2. PROJECT HISTORY AND BACKGROUND

In 1994, PDSI proposed the Safford Land Exchange with the Bureau of Land Management (BLM) for the purpose of consolidating PDSI's property holdings in the Safford Mining District. Through the proposed land exchange, PDSI would acquire public lands (referred to as the Selected Lands) within and adjacent to its existing private property in the District in exchange for other lands (the Offered Lands) in southeast Arizona currently owned by PDSI. Initial scoping for the Safford Land Exchange occurred during the fall of 1994.

PROJECT AREA





KEY

LAND OWNERSHIP

- BLM
- STATE
- TRIBAL LANDS
- PHELPS DODGE
- PRIVATE

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Scale 0 1 2 3 Miles

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DOS POBRES/SAN JUAN
PROJECT PLAN OF OPERATION
ENVIRONMENTAL IMPACT STATEMENT

FIGURE 1A. PROJECT LOCATION MAP

During this process two separate events occurred; PDSI was made aware of the U.S. Army Corps of Engineers' (COE) likely requirement of an EIS as a component of the COE's public interest review under Section 404 of the Clean Water Act (CWA), and PDSI's understanding of the maine plan improved such that they were able to define the project and development schedule. In response to these events, PDSI submitted an MPO to the BLM in May 1996 pursuant to the General Mining Law of 1872 and its implementing regulations at 43 CFR Section 3800, subpart 3809. This MPO describes the proposed Dos Pobres/San Juan Project.

The Dos Pobres/San Juan Project (the Project) is an integrated mining operation that includes the development of two open pit copper mines with one solution extraction/electrowinning (SX/EW) processing facility and shared infrastructure and support facilities. PDSI is continuing to pursue the land exchange as an alternative to BLM's authorization of the Dos Pobres/San Juan Project MPO.

The Project area is located in Graham County, north of the town of Safford, Arizona (Figure 1A). The District consists of four known, undeveloped porphyry copper deposits (Dos Pobres, San Juan, Lone Star, and Sanchez), all of which are owned or controlled by PDSI.

As a result of PDSI's submittal of an MPO and in light of CWA permitting requirements, the BLM has requested that the COE and the Environmental Protection Agency (EPA) participate as cooperating agencies in the BLM's NEPA review of the mine plan. Because submittal of the Plan of Operations was a significant change in the scope of the original exchange project, the BLM reinitiated the scoping process for the EIS. A Notice of Intent to prepare and EIS was published in the Federal Register on July 31, 1996, and public scoping meetings were held on September 5, 10, and 11, 1996, in Safford, Tucson, and Phoenix, Arizona, respectively. The scoping period closed on October 12, 1996.

1.3. Purpose and Need For the Project

PDSI currently owns land north of Safford, Arizona, containing all of the Dos Pobres copper ore body and portions of a separate copper ore body known as the San Juan deposit. Additionally, PDSI has existing mining claims to the remainder of the San Juan ore body and to public lands surrounding both of these deposits. The proximity of these ore bodies to one another and to the nearby Lone Star and Sanchaz copper ore deposits, where PDSI also owns property or has existing mining claims , provides opportunities to combine certain elements of mine infrastructure. In accordance with requirements of the Section 404(b)(1) guidelines, for the purpose of determining a project's water dependency, the basic project purpose is to mine copper. For the purpose of developing alternatives, the overall project purpose is to develop the mineral resources associated with the Dos Pobres and San Juan leach able copper ore deposits as an integrated project using conventional open pit mining and SX/EW technologies to meet a continuing demand for copper.

1.4. PROJECT AREA DESCRIPTION

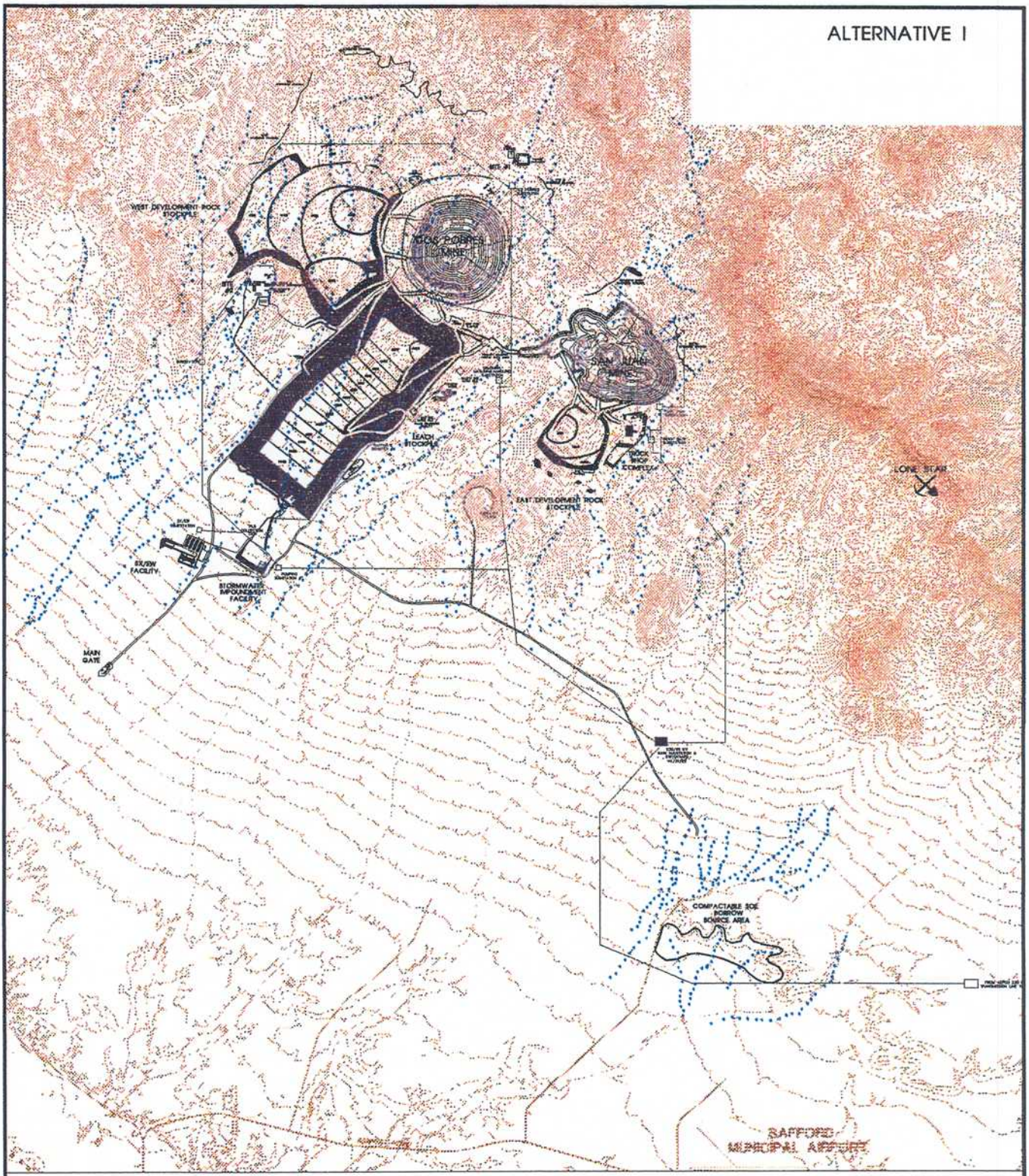
The proposed Dos Pobres and San Juan mine pits are located approximately 7 to 8 miles north of the Gila River near Safford, Arizona, at an elevation of approximately 4,100 ft. Above mean sea level (amsl) in the foothills of the Gila Mountains (Figure 1A). The ridge line of the Gila Mountains, at its closest point to the mine pits, rises to an elevation of approximately 6,050 ft. amsl at Weber Peak approximately 2.5 and 1.5 miles east of the Dos Pobres and San Juan pits, respectively.

Between the proposed mine site and the Gila River is a broad gently sloping plain. Vegetation in the uplands of this area is characteristic of Sonoran Desertscrub habitats and is dominated by broad creosote flats. As the project area increases in elevation towards the Gila Mountains, upland vegetation communities gradually transition to Semidesert Grassland Habitat types.

Drainage patterns in the project area are characterized in many places by braided channel systems or sheet flow and in other areas drainage patterns are dendritic. All of the drainages in the project area are ephemeral washes and the major drainages report to the Gila River just north of Safford. The primary drainages within the project area, from east to west, are Wilson Wash, Peterson Wash, Cottonwood Wash, Talley Wash, Watson Wash, and Coyote Wash. Figure 1B depicts the distribution of Waters of the United States in relation to PDSI's preferred alternative, Alternative I. In the vicinity of the project area there are three springs, Cottonwood, Hackberry, and Bryce Springs, and one small seep referred to as DP Seep. The springs are outside of the foot prints of disturbance for the proposed project, while DP Seep is within the footprint of the proposed Dos Pobres pit.

Xeroriparian vegetation in the project area is generally open and patchily distributed. As is typical with xeroriparian vegetation, most of the plant species present also occur in upland habitats, though in xeroriparian habitats they typically occur at higher densities and/or generally in larger sizes. Total vegetation volume (TVV) in washes in the project area typically ranges from 0.25 to 0.65 m^3/m^2 and averages approximately 0.45 m^3/m^2. In comparison, upland habitats on this property have vegetation volume of from 0.1 to 0.33 m^3/m^2 and averaged approximately 0.25 m^3/m^2.[2] Xeroriparian areas have been qualitatively assigned to three categories based upon apparent channel width identified from available aerial photography. Category 1 xeroriparian areas, the widest channels, supported the lowest vegetation volumes (0.31 m^3/m^2). Average vegetation volume in category 2, intermediate channel widths, and category 3, the narrowest channel widths, supported nearly identical amounts of vegetation (0.46 m^3/m^2 and 0.47 m^3/m^2,

[2] For comparison, well vegetated upland Sonoran Desert Scrub habitat in Northwest Tucson will typically have TVV slightly greater than 0.5 m^3/m^2; Mesquite Bosques typically exceed 1.5 m^3/m^2 and mature Cottonwood/Willow riparian habitats typically exceed 3.0 m^3/m^2.



KEY

WATERS OF THE UNITED STATES POINT LOCATION

Scale

0 3,000 6,000

FEET

N

DOS POBRES/SAN JUAN PROJECT PLAN OF OPERATION ENVIRONMENTAL IMPACT STATEMENT

FIGURE 1B. DISTRIBUTION OF WATERS OF THE UNITED STATES IN RELATION TO ALTERNATIVE I.

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respectively). Creosotebush, not normally considered to be a riparian plant, comprised 30.4%, 23.0%, and 33.9% of the total vegetation volume in category 1, 2, and 3 xeroriparian areas, respectively. Other dominant plant species in the xeroriparian habitats that occur within the project area included catclaw acacia, mesquite, blue paloverde, whitethorn acacia, and burroweed.

Table 1. Dominant Plant Species Within Xeroriparian Habitats and Adjacent Upland Habitats in the Project Area.

	Category 1	Category 2	Category 3	Category 4
No. Transects	21	61	92	36
No. Points	702	894	629	720
No. Washes or Areas	5	11	13	9
Mean Width (m)	66.8	29.4	13.6	na
Mean Vegetation Volume	0.31	0.46	0.47	0.24
			Percent Dominance	
Creosotebush	30.4%	23.0%	33.9%	63.3%
Mesquite	11.3%	22.0%	4.8%	1.2%
Catclaw Acacia	14.3%	21.4%	10.1%	0.7%
Whitethorn Acacia	5.1%	4.4%	20.7%	0.6%
Blue Paloverde	8.7%	6.5%	10.1%	0.8%
Burroweed	14.1%	4.1%	2.8%	0.6%
Desert Broom	6.7%	2.9%	0.6%	0.0%
Snake Weed	1.3%	2.3%	3.2%	3.7%
Prickly Pear	0.0%	0.0%	< 0.1%	5.6%
Perennial Grasses	1.0%	4.0%	7.1%	16.5%
All Other Species	7.1%	9.4%	6.7%	7.0%

2. FORMULATION AND ANALYSIS OF ALTERNATIVES

2.1. FORMULATION OF ALTERNATIVES

2.1.1. General Mining Considerations. The formulation of alternatives to the proposed MPO (the Proposed Action) has been based upon information provided by the COE, BLM, and PDSI. The basic premises underlying the formulation of alternatives are summarized below.

The formulation of alternatives is consistent with typical mine planning approaches. PDSI, in proposing a leach operation for an open pit oxide copper mine, has already determined that an underground mine or *in situ* leach operation is not practicable and that the mineralogical characteristics of the leachable ore

deposits make other extraction and processing techniques, such as concentrating and smelting, inappropriate.[3]

In practice, the formulation of alternative mine development scenarios for an open pit copper mine starts with pit location and design considerations, followed by the identification of suitable locations for development rock stockpiles, leachable ore stockpiles, and associated shops and other facilities, etc. Pit size and configuration are based upon a number of criteria, including: 1) the nature and extent of the economic ore body as determined by projected future copper prices, projected capital and operating expenses, and corporate decisions regarding acceptable levels of risk; and 2) pit stability considerations which determine setbacks and pit wall slopes necessary to achieve stable slopes and desired safety standards. Once the pit size and volumes of overburden, development rock, and ore have been defined, mine engineers then can identify suitable storage locations for overburden and development rock and acceptable locations for leach stockpiles and other facilities. The siting and sizing of leach stockpiles and development rock stockpiles are then based upon a variety of technical, logistic, economic, and environmental considerations. The formulation of alternatives in this analysis follows this general approach.

PDSI has formulated alternatives for the Dos Pobres/San Juan Project based upon the mine planning approach outlined above. The development of leachable ore reserves within the Dos Pobres and San Juan pits will result in a fixed volume of material (development rock and ore) that must be dealt with in a manner that achieves the Project's overall purpose and need and is practicable, as defined by 404(b)(1) criteria.

The placement of development rock stockpiles and leach stockpiles relative to the pit is not completely independent of one another (i.e., a leach stockpile cannot be placed in the same location as a development rock stockpile and haul roads for both types of facilities cannot cross active leach facilities, etc.), therefore, this alternatives analysis treats the pits, leach facilities, and development rock stockpiles as interdependent units. Each interdependent unit is referred to in this document as a configuration alternative.

In addition to configuration alternatives, this analysis also investigates alternative mine locations, and alternatives associated with the placement of the SX/EW facility and the source for compactible soils for the leach stockpile liner system.

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[3] The Dos Pobres/San Juan Project Plan of Operations is a mine for leach operation for an open pit oxide copper mine. Concentrating sulfide copper ore could become feasible in the later years of the mine life at Dos Pobres.

The Sanchez and Lone Star copper deposits are identified as sequencing alternatives within the Project. PD considers both deposits as alternatives to the sequencing of mine development activities within the Safford District and not exclusionary alternatives to the Dos Pobres/ San Juan Project. The evaluation of any mine property owned by PDSI, or potentially acquirable by PDSI, in an alternatives analysis would be an analysis or sequence of alternatives, not exclusionary alternatives (such as mine configuration alternatives). Considering the nature of PDSI's business and current and potential future demands for copper products, any ore body controlled by PDSI is subject to development if it proves to be economically, technically, and logistically practicable.

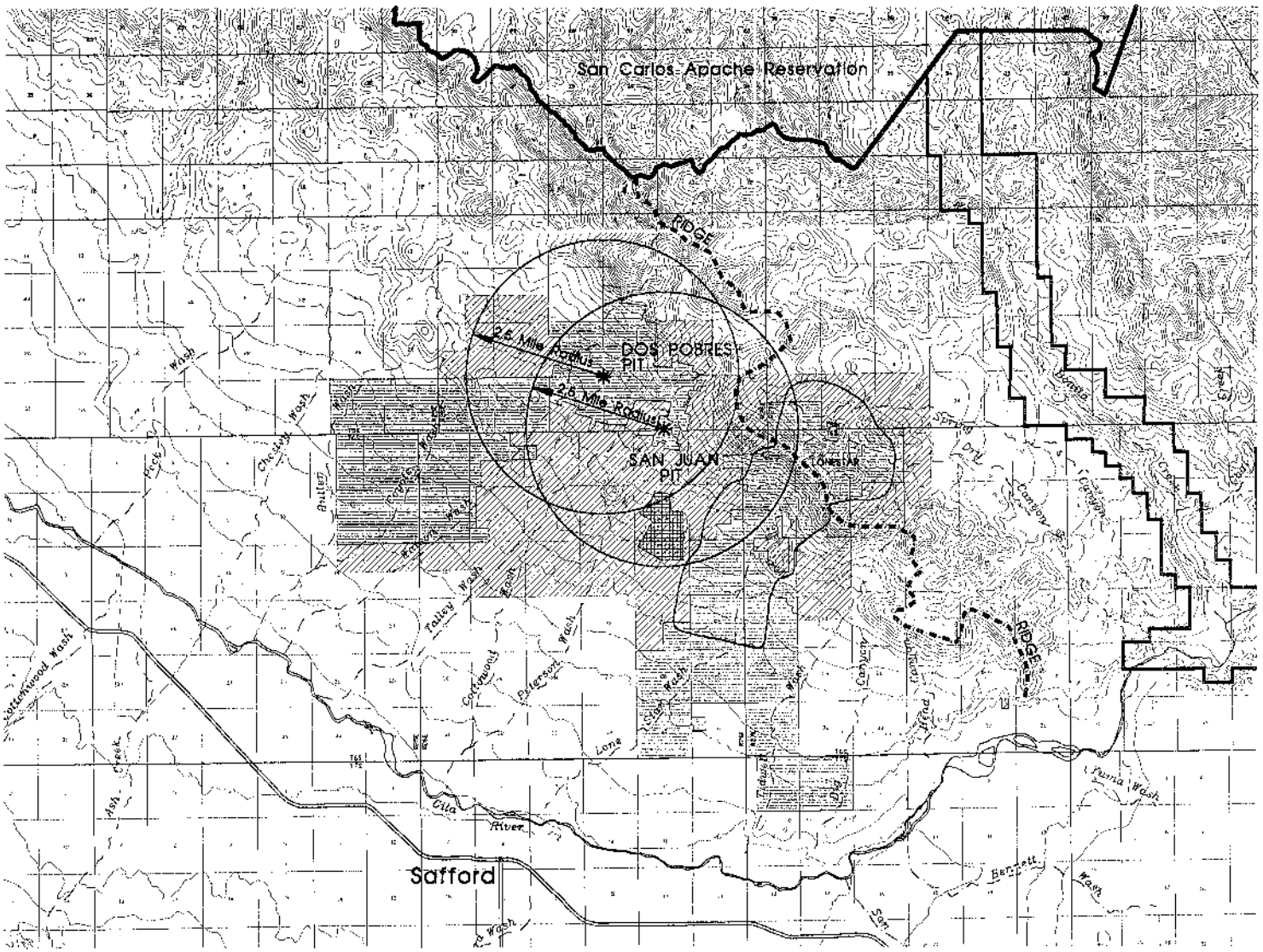
2.1.2. Geographic Considerations. The geographic range of alternatives considered in this analysis is based upon the project's purpose and need (Section 1.3) and has been further constrained by economics and logistics of materials transport (Figure 2) and ownership or controlling interest in copper ore bodies in the region by PDSI. These geographical constraints are briefly discussed below.

The area initially considered suitable for evaluation of configuration alternatives is bounded by major topographic and/or geographic features of the region. The southern boundary is the Gila River, the eastern boundary is the Gila Box Riparian National Conservation Area and Bonita Creek, and the boundary of the San Carlos Apache Reservation defines the northern boundary.

Whereas no topographic feature or legal boundary constrains the mine plan area to the west, cost considerations for haulage distance limit the western extent of the geographic area for alternatives. Identification of suitable sites for placement of development rock and for construction of leach stockpiles is further constrained by the Gila Mountains because of the effects upon haulage costs. The relationship between haulage distance and cost also creates economic constraints that ultimately affect an alternative's practicability.

Figure 2 depicts two 2.5 mile radius circles, each centered on the approximate center of the Dos Pobres and San Juan pits. As a general rule, it is not economic to transport rock material for the project more than 2.5 miles from the pit, although some material may be hauled beyond this distance.[4] Placement of development rock or leach stockpile facilities farther than 2.5 miles from the mine is logistically and economically impractical.

[4] At PD's Morenci Mine in Greenlee County, Arizona, the longest haul distance is approximately 3 miles from the pit and most haul distances are considerably shorter.



QUADRANGLE LOCATION

KEY

- SELECTED LANDS
- PD OWNED LAND
- MELODY CLAIM GROUP
- GILA BOX RIPARIAN NATIONAL CONSERVATION AREA
- SAN CARLOS APACHE RESERVATION

Scale

0 1.5 3

MILES

Sources:
Hydrography – USGS 1:100,000 scale DLG
Transportation – USGS 1:100,000 scale DLG
Contour Lines– Derived from USGS 1:250,000 scale DEM contours produced by Sylvan Ascent, Inc.
CD/MAPS Santa Fe, New Mexico.

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DOS POBRES/SAN JUAN PROJECT PLAN OF OPERATION ENVIRONMENTAL IMPACT STATEMENT

FIGURE 2. GEOGRAPHIC EXTENT OF STUDY AREA

2.2. PRACTICABILITY CRITERIA

An alternative is deemed practicable if it is "available and capable of being implemented after taking into consideration existing technology, logistics, and economics in light of overall project purpose" (33 CFR §332-330). This section identifies the specific criteria used to evaluate the practicability of the configuration alternatives to the Dos Pobres/San Juan Project.

2.2.1. Land Position. The presence of mining claims controlled by parties other than PDSI and non-PDSI patented lands within the District is a logistical constraint that limits the possible locations of facilities. The Melody Claims located in Sections 11 and 14 of T6S, R26E, are controlled by multiple entities other than PDSI. Negotiations for PDSI's purchase of the claims have, to date, been unsuccessful. PDSI is also negotiating to purchase the patented Horseshoe Mine property located in Sections 8 and 17 of T6S, R27E. As long as these claims or private lands are controlled by others, these lands are not available for placement of mine-related facilities.

2.2.2. Interference with Development of Other Ore Reserves. PDSI has identified sulfide ore milling reserves beneath the portion of the Dos Pobres oxide ore body currently proposed for mining. PDSI has also partially defined a copper deposit at Lone Star. While development of the Dos Pobres sulfide reserves or the Lone Star deposit is not part of the current proposed project, mine plans for Dos Pobres and San Juan that significantly restrict or limit the ability of PDSI to develop these resources in the future are not practicable.

2.2.3. Capable of Development within Reasonable Time Frames. For an alternative to be practicable and meet the purpose and need for the project, there must be sufficient information available to 1) document with reasonable levels of certainty the economic viability of the alternative, and 2) demonstrate the logistic and technical feasibility of the development effort. Alternatives that would require temporally extensive (five or more years) exploration or technical feasibility evaluations were considered logistically impractical.

2.2.4. Stockpile Capacity Provides Storage Buffer. Mine feasibility drilling data are based upon exploration drill holes placed on approximately 400 foot centers. At this level of resolution it is likely that the reserves identified will either increase or decrease as more detailed information is generated once mining activities begin. Stockpile facilities must be able to efficiently accommodate a reasonable volume of additional material without significantly decreasing leach facility efficiencies. Alternatives which do not provide sufficient storage capacity to allow for potential increases in the volume of ore present in the

current MPO could logistically impinge upon the development of the ore body. All alternatives were evaluated for economic consideration as well as reasonable time frame considerations.

2.2.5. Economic Consideration. As a publicly held corporation, PDSI has a fiduciary responsibility to its stock holders to provide a reasonable return on investment balanced against the risks associated with achieving those returns. PDSI, after developing the range of alternatives presented in this Analysis, projected capital and operating costs through the life of mine for each alternative. These costs and the cash flow associated with them were then evaluated by PDSI using internal rate of return (IRR) and net present value (NPV). The (IRR) and (NPV) are typical standards for measuring the economic viability of a project. They measure the ability of the income from the project to repay the capital investment and to provide a reasonable return on that investment. IRR is that discount rate which equates the present value of a project's expected cash inflows to the present value of a project's expected cost. NPV is the sum of all project costs and income discounted at the project's cost of capital. The discount rate is the cost of capital, either assumed or actual, for the project and present value is the current worth of an amount of money to be paid at some future date based upon an assumed discount rate.

Based on the risk associated with development of a project of this type, specifically fluctuating copper prices in the world copper market, estimated leach recoveries and minable reserves, and increasing competition from low cost producers, internal PDSI screening criteria were used to determine the economic viability of alternatives. From a valuation perspective, the parameters used for internal screening are supported in industry and investment communities to measure an acceptable rate of return for mining investments in prefeasibility and feasibility planning. Economic data are considered privileged and confidential considering the effect such information can have on PDSI's competitive abilities within the market. Economic information utilized to complete this assessment was provided to the Corps of Engineers under separate cover.

2.3. CONFIGURATION ALTERNATIVES DESCRIPTION AND PRACTICABILITY DETERMINATION

Each of the nine configuration and two location alternatives considered are briefly described below. Following each description is a discussion of each alternative's practicability. Table 2 summarizes the key differences between each of these alternatives.

2.3.1. Alternative A: Two Leach stockpiles. This alternative (Figure 3) is the original MPO submitted by PDSI to the BLM in May 1996. Development of Alternative A includes two leach stockpiles, one located to the south of the Dos Pobres pit and one to the south of the San Juan pit. This alternative is strictly a run-of-mine (ROM) operation which does not include crushing of the leach material. Oxide ore

in each pit would be mined year-round using conventional drill and blast techniques. After blasting, run-of-mine sized ore from each pit would be loaded by shovels onto haul trucks, which would transport the ore to separate, lined leach stockpiles located south-southwest of each pit. At completion, the roughly 716-acre Dos Pobres pad would be approximately 400 feet high, with about sixteen 25-foot high lifts. The average slope of the sides of the leach stockpile will be 2H:1V. The San Juan pad would cover approximately 634 acres, with the same height, number of lifts, and slopes as the Dos Pobres pad.

Down-gradient (south) of each leach stockpile would be a pregnant leach solution (PLS) collection tank and a stormwater impoundment/overflow pond. PLS would be pumped via pipelines from each tank for processing at a shared SX/EW facility, which would be located on PDSI property.

The Dos Pobres pit, which is located entirely on PDSI property, is nearly circular in shape with a diameter of approximately 4,200 feet, a maximum depth of 1,400 feet below the surface elevation, and a surface area of roughly 319 acres. Surrounding the Dos Pobres pit is an approximately 1,300-foot setback in which no leach or development rock stockpiles or other facilities would be located. This setback has been designed primarily to allow for potential future mining of the deeper sulfide milling reserves that underlie the leachable ore at Dos Pobres. The San Juan pit, which would be located in part on PDSI private land as well as BLM lands, is roughly oval in shape, with a maximum diameter of approximately 5,200 feet, a maximum pit depth of about 1,000 feet below surface elevation, and a surface area of about 323 acres.

Development rock, consisting of low grade and unmineralized rock, would be removed from the pits and stockpiled within unlined facilities adjacent to the Dos Pobres mine. One development rock stockpile would be located west and one east of the Dos Pobres pit and together would cover a total of approximately 782 acres.

Practicability Determination: This alternative is not practicable as a result of land use conflicts between the originally proposed MPO and the Melody Claim group which is controlled by others. Resizing the San Juan Leach facility to avoid the Melody Claim group would have a significant adverse effect on project economics due to considerations of scale and capital expense.

2.3.2. Alternative B: Single Leach Stockpile Constructed with a Conveyor/Stacker. Alternative B (Figure 4) would have a single leach stockpile located south-southwest of the Dos Pobres Mine. With this alternative, a crush/convey/stack system would replace a portion of the standard load and haul ore transport methods used in traditional ROM operations. After blasting, ore from each pit would be loaded by shovels onto trucks and most of it hauled to a crushing facility. From the crushing facility a conveying and stacking system would transport and deposit the crushed ore onto a single lined pad located south-southwest of the Dos Pobres pit. The mobile conveyor leading to the stacker requires a shallow slope of

4H:1V on the east side of the stockpile, increasing the required surface area of the pad. The slopes on the remaining sides of the stockpile are designed at a 2H:1V slope.

A 782-acre development rock stockpile would be placed west of the Dos Pobres Mine and another development rock stockpile would be located south of the San Juan Mine which would cover approximately 170 acres.

Practicability Determination: This alternative is not practicable. The feasibility of employing the mobile elevating conveyor concept is technically uncertain, given the fact that there is no current application of this technology at this scale, adding to the economic risk of this alternative. Mobile stacking and conveying systems which place crushed leach material at the planned production rate of 100,000 tons per day have been built. The uncertainty arises from the mobile elevating conveyor which would be used to lift the material to the ultimate 400 ft. stockpile height. A mobile elevating conveyor of this size and configuration has never been built before.

The economics of this alternative fall significantly short of the economic thresholds established to determine practicability due to increased capital costs associated with the mobile elevating and stacking conveyors and additional liner requirements. The IRR and NPV for this alternative are significantly below the established practicability threshold.

2.3.3. Alternative C: Partial Backfill of San Juan. Pit configuration and sizing of this alternative are identical to Alternative A except that the San Juan pit would be partially backfilled with development rock from the San Juan and Dos Pobres Mine (Figure 5). Other features, such as the size and configuration of the Leach Stockpile, are identical to Alternative I. Placing a portion of the development rock in the San Juan pit slightly reduces the height and footprint of the development rock stockpiles located to the west of the Dos Pobres pit and to the south of the San Juan pit. The earliest that partial backfilling of the San Juan pit could begin is estimated to be in Year 10 of the Project since a portion of the San Juan pit must be mined out prior to commencing backfilling activity.

Further opportunity may exist to minimally reduce the footprint of the stockpiles by maintaining the currently planned development rock stockpile height of 400 ft. Mine phasing, the distribution of oxide ore reserves, and the known sulfide ore resource do not provide the opportunity for partial backfill of the Dos Pobres pit.

Practicability Determination: This alternative has been determined to be practicable. This option has a negative economic impact, requiring a longer haulage profile for development rock from the Dos Pobres

pit which is only partially offset by a shorter haulage profile for material from the San Juan pit. This option has no effect on the leach stockpile configuration.

Execution of this alternative would result in an IRR and NPV only slightly below established practicability thresholds. While IRR and NPV are slightly below threshold levels, considering the variability among cost estimating factors utilized for economic analysis, this alternative is considered practicable.

2.3.4. Alternative D: Reduced San Juan Pit. The Dos Pobres pit would be excavated as described in Alternative A. A portion of the San Juan ore body (approximately 31%) would remain undeveloped to avoid disturbing portions of Peterson Wash (Figure 6). Approximately 69 percent of the ore reserves within San Juan would be mined. Under this alternative, development rock stockpiles and other mine facilities would be identical to those described in Alternative I. The leach stockpile, which would be located as in Alternative I, would be constructed with similar slopes and methods but would be approximately 137 acres smaller.

Practicability Determination: This alternative is not practicable. Restriction of mining activity in the area of Peterson Wash results in a 31 percent decrease in the San Juan pit's minable ore reserve. While this option would result in decreased impacts to jurisdictional waters (ca. 2.21 acres when compared to Alternative I) it has a significant negative impact on project economics and does not allow Phelps Dodge to fully develop the San Juan resource to its economic limits. This alternative results in an IRR and NPV that are considerably below established practicability thresholds.

2.3.5. Alternative E: Dos Pobres Mine Only. Under this alternative, only the Dos Pobres ore body would be mined (Figure 7). The San Juan pit, and associated development rock stockpiles would not be developed. Development of the Dos Pobres ore body would proceed as described in Alternative A. The leach stockpile would be approximately 268 acres smaller than the Alternative I configuration but otherwise would be constructed in a manner similar to that described for Alternative I.

Practicability Determination: This alternative is not economically practicable. Alternative E limits mining to only the Dos Pobres ore body which reduces the leachable reserves by approximately 53 percent. The relatively high stripping ratio at Dos Pobres compared to San Juan, and loss of economic synergies created by the proximity of the Dos Pobres and San Juan ore bodies has significant adverse affects upon mine economics. The IRR and NPV are appreciably below established practicability thresholds.

2.3.6. Alternative F: San Juan Mine Only. Under this alternative only the San Juan ore body would be developed (Figure 8). All production operations would be identical to those described for the San Juan mine in Alternative I, except the Dos Pobres mine and development rock stockpiles would not be

constructed. For this alternative the leach stockpile was located similarly to the other alternatives because of the position of the Melody Claim group.

Practicability Determination: This alternative is not economically practicable. Alternative F limits mining to only the San Juan deposit and reduces the leachable reserve by approximately 47 percent. The reduced capital expenditures associated with a San Juan only project would not offset the lost economic synergies that result from excluding the proximity of the Dos Pobres ore body. This reduction would result in a significantly decreased internal rate of return and net present value that are well below the established practicability thresholds.

2.3.7. Alternative G: No Set Back at Dos Pobres. Under this alternative, the 1,300-foot setback around the Dos Pobres pit included in all other Dos Pobres Mine alternatives would not be provided (Figure 9). Other aspects of the mine would be similar to those proposed for Alternative I.

Practicability Determination: This alternative is not logistically practicable. A setback of approximately 1,300 feet between Dos Pobres pit limits and the edge of the stockpiles enables future development of the sulfide milling reserves located beneath the leachable ore reserves. The decision to develop the sulfide reserves may be made by Year 5 of the Dos Pobres/San Juan Project life, after completion of engineering and economic feasibility analysis.

While eliminating this setback improves Dos Pobres/San Juan Project economics through decreased haulage costs, it does little to reduce impacts to jurisdictional waters of the U.S. Furthermore, it is not prudent to place stockpiles on top of a known resource if development of that resource would require removal and relocation of those stockpiles.

2.3.8. Alternative H: A Single 700-Foot High Leach Pad. Consideration was given to increasing the leach stockpile height in order to reduce the pad footprint and reduce impacts to waters of the United States. This alternative is identical to Alternative I except for the height (700 feet) and area (approximately 676 acres) of the leach pad.

Practicability Determination: Construction of a 700 ft. high leach pad would present several logistical problems from an operational standpoint and would result in insufficient top-of-pad surface area to optimize leach operations. After Year 8 of the project, leach recovery values would be significantly reduced for the remaining eight years of the project. The leach parameters adversely affected by this modification include leach cycle time, lift height, and solution flow rates. Additionally, the 700 ft. pad height would not provide storage for any additional leachable ore which might be encountered once mining commences. Not allowing for the potential for increased leachable reserves within the single pad configuration may